



***Piston
Accumulators***

***3,000 and 5,000 PSI
1 Pint to 5,000 Gallon***



► Piston Accumulators

Accumulator Uses

1. Pressure holding
2. Energy conservation
3. Pump supplementation
4. Noise reduction
5. Pressure surge protection
6. Pulsation dampening
7. Fluid dispensers
8. Emergency power source
9. Dual pressure circuits
10. Make up fluid for holding devices
11. Leakage compensation
12. Thermal expansion volume compensation
13. Transfer barrier
14. Increase response time
15. Pump supply to reduce cavitation

Standard Products

- One pint to 50 gallon
- 3,000 and 5,000 PSI operation (per catalog standard)
- Piston design using the latest in

- seal and bearing technology
- Standard operating temperature: -40° F to +220° F
- Operation with conventional hydraulic oils
- Gas side is dry nitrogen gas

Custom Options Available

- Pressures to 30,000 PSI
- 100 gallon or higher capacity
- Stainless steel or other special materials as required
- Special design requirements and safety factors
- Seals for synthetic fluids, fuel, water or exotic fluids
- Chrome or other types of plating
- Domestic and foreign coding available

Immediate Delivery

- Most popular sizes are in stock for immediate delivery
- Three to five day delivery on balance of standard models

Safety Features/Designs

- Cannot be disassembled while pressurized
- Integrated pressure relief design
- 100% testing to 150% of operating pressure
- 4 to 1 safety factor in designs

Technical Support

There is a fully staffed engineering group at our Oregon facility to handle special needs. When those needs arise, please contact our distribution. Please furnish the following basic information to expedite your request:

- Maximum and minimum working pressure
- Maximum and minimum working temperature
- Flow requirements
- Cycle frequency and number of cycles
- Type of fluid
- Corrosivity of environment
- Overall size restriction

Considerations in the Sizing of Piston Accumulators

The fraction of the total accumulator volume that can actually be discharged into the hydraulic system depends upon: (1) the ratio of the precharge pressure to the minimum system working pressure, (2) the ratio of the minimum system working pressure to the maximum system

pressure, (3) accumulator temperature at precharge/ accumulator temperature in service maximum and minimum, and (4) the rate that the accumulator is charged or discharged (Isothermal, polytropic, or adiabatic expansion/compression process).

So that the accumulator piston does not impact the cap end of the accumulator upon discharge, it is

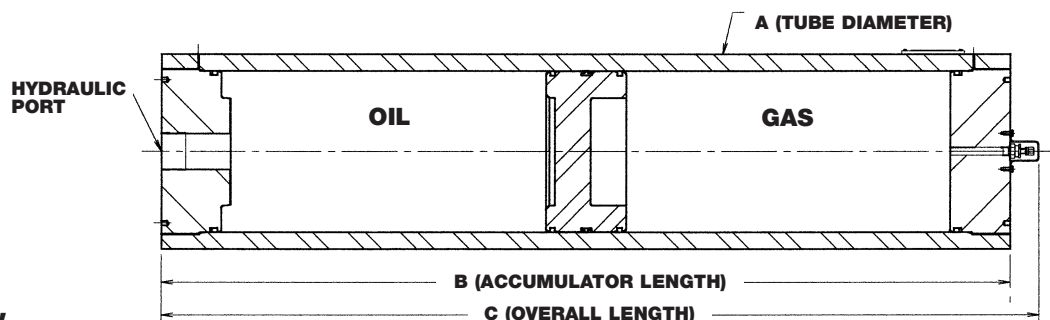
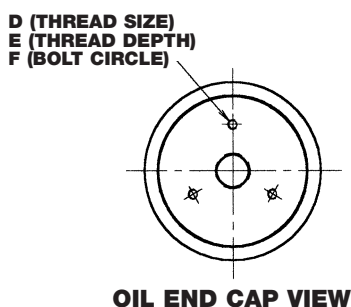
recommended that the system precharge pressure (corrected to the maximum system operating temperature) be less than or never quite equal to the minimum system working pressure. If it is assumed that the precharge level is set at the minimum system working pressure, the simplified relationships shown in the following table are derived:

Ratio* Volume Discharged to Total Accumulator Capacity

PMIN PMAX	ISOTHERMAL (SLOW)	POLYTROPIC (R = 1.25)	ADIABATIC (RAPID)
0.0	1.000	1.000	1.000
0.1	0.900	0.842	0.807
0.2	0.800	0.724	0.683
0.3	0.700	0.618	0.577
0.4	0.600	0.520	0.480
0.5	0.500	0.426	0.390
0.6	0.400	0.335	0.306
0.7	0.300	0.248	0.225
0.8	0.200	0.163	0.147
0.9	0.100	0.081	0.070
1.0	0.000	0.000	0.000

* NOTE: Assumes precharge pressure equals minimum system pressure. Pmin minimum system working pressure, psia; Pmax maximum system pressure, psia.

Another important consideration in accumulator sizing is the relationship between the accumulator flow rate and piston speed, depending upon the diameter of the accumulator and the seal velocity. Also of concern in sizing is the effect on total seal travel. The length to diameter ratio affects these considerations.



► Dimensions

3000 PSI Piston Accumulators

Model Number	Fluid (gal)	Volume (cu in)	A (in)	B (in)	C (in)	D (UNC)	E (in)	F (in)	Hydraulic Port	Weight (lbs)
2PA-M1SS	1 pint	29	2.5	12.25	13.75				SAE-12 (3/4")	9
2PA-M2SS	1 quart	58		21.5	23					13
4PA-M2SS	1 quart	58	4.75	9.19	10.69	5/16"-18	0.47	3	SAE-12 (3/4")	29
4PA-M4SS	0.5	116		13.88	15.38					36
4PA-M8SS	1	231		23	24.5					50
4PA-M12SS	1.5	347		32.19	33.69					63
4PA-M20SS	2.5	578		50.63	52.13					90
6PA-M8SS	1	231	6.75	15.19	16.69	1/2"-13	0.75	4.25	SAE-24 (1 1/2")	84
6PA-M12SS	1.5	347		19.63	21.13					96
6PA-M20SS	2.5	578		28.56	30.06					121
6PA-M40SS	5	1155		50.88	52.38					183
6PA-M60SS	7.5	1733		73	74.5					245
6PA-M80SS	10	2310		95.25	96.75					307
7PA-M20SS	2.5	578	9	22.63	24.25	5/8"-11	0.94	6	1 3/4" Code 62	212
7PA-M40SS	5	1155		35.63	37.25				4 bolt flange	284
7PA-M60SS	7.5	1733		48.75	50.38					356
7PA-M80SS	10	2310		61.81	63.44					428
7PA-M120SS	15	3465		87.94	89.56					572
9PA-M80SS	10	2310	10.88	47.63	49.25	3/4"-10	1.13	7	2" Code 61	507
9PA-M120SS	15	3465		65.75	67.38				4 bolt flange	657
9PA-M160SS	20	4620		83.88	85.5					808
12PA-M200SS	25	5775	14.13	67.94	69.56	1"-8	1.5	8	2" Code 61	1255
12PA-M240SS	30	6930		78.56	80.19				4 bolt flange	1401
12PA-M320SS	40	9240		99.88	101.5					1694
12PA-M400SS	50	11550		121.19	122.81					1986

Notes:

- 1) SAE-24 and SAE-32 ports are available as an option. Most SAE-24 and SAE-32 ports are rated lower than 3000 psi.
- 2) 3" Code 61 4 bolt flange ports are available as an option. 3" Code 61 4 bolt flange ports are rated at 2000 psi.
- 3) 2", 3" and 6" bore come standard with cored gas valves. 7", 9" and 12" bore come standard with poppet (military) gas valves.
- 4) ASME certified accumulators are available. 7", 9" and 12" bore accumulators comply with ASME material specifications as standard.

5000 PSI Piston Accumulators

Model Number	Fluid (gal)	Volume (cu in)	A (in)	B (in)	C (in)	D (UNC)	E (in)	F (in)	Hydraulic Port	Weight (lbs)
2PA-H1SS	1 pint	29	2.75	12.5	14.13				SAE-12 (3/4")	21
2PA-H2SS	1 quart	58		21.69	23.31					24
4PA-H2SS	1 quart	58	5.25	9.63	11.25	5/16"-18	0.47	3	SAE-12 (3/4")	43
4PA-H4SS	0.5	116		14.25	15.88					55
4PA-H8SS	1	231		23.5	25.13					79
4PA-H12SS	1.5	347		32.63	34.25					102
4PA-H20SS	2.5	578		51	52.63					149
6PA-H12SS	1.5	347	7.5	20.25	21.88	1/2"-13	0.75	4.25	SAE-16 (1")	151
6PA-H20SS	2.5	578		29.13	30.75					197
6PA-H40SS	5	1155		51.38	53					312
7PA-H40SS	5	1155	10.19	37.19	38.81	5/8"-11	0.94	6	2" Code 62	501
7PA-H60SS	7.5	1733		50.25	51.88				4 bolt flange	639
7PA-H80SS	10	2310		63.31	63.94					777

Notes:

- 1) All sizes come standard with poppet (military) gas valves.
- 2) ASME certified accumulators are available. 7" bore and above accumulators comply with ASME material specifications as standard.



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